Comparison of the Statistic Balance Indexes Among the Female Students (11-15) Having Posture Abnormalities in the Lower Limb of Knee-Valgus and Genu-Varus

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INTRODUCTION

The balance is surely one of the inseparable components of all the routine activities and a determinative index in studying the functional ability. Gaining and keeping balance in the static condition or the active mode, requires to produce sufficient power by the muscles and apply it to body levers (the bones) which requires the complex interaction between nerve system and muscular-skeleton system. In the static position the nerve components form the motional (nerve-muscular system), the sensory (body-sensory, auricular and sight system) and the nerve processes in higher levels [16], while in the dynamic position, keeping more balance depends on the body-sensory processes [4]. In other hand the balance as a controversial concept of sensory-motional system, studies the complex interaction between sensory inputs and required motional responses to alter or protect the posture [5]. The system of controlling balance and position, is a complex and regular mechanism that coordination among these three balance systems (the sight, auricular and body-sensory) plays a vital role in it. Cooperation of these systems with each other results in balance and posture control. In order to be in a standing posture the central and circumferential components of the nerve system act mutually, continually and desirably to protect the body direction and the gravity center in the learning surface area. The central nerve system analyzes the circumferential inputs of the afore said systems and selects the most suitable muscular response to control the posture and body condition[17,15]. Since the foot is protected in a closed motional chin and is relied on the interwoven feedback of joint motions in the pelvis, knee and wrist. The balance might be disturbed by a disorder in sensory afferent information in mechanical strength and stability of all the joints or the lower limb structure. Studying the weaknesses and abnormalities of muscular-skeleton system is the subject matter in the sport science. The abnormalities generally have been appeared in the childhood and growth age due to unsuitable motional habits, weak movements and unsuitable environmental conditions. They’re also been gradual [3]. Supposing that the lower limb abnormalities might affect the person’s balance, they could cause some problems in walking, running, jumping and basic motional skills. Considering the balance control role in routine activities and increasing statistics of lower limb abnormalities, this work tries

to compare the static balance of female students (11-15) having postural abnormalities in the lower limb of knee-valgus and genu-varus.

The research method:

To assess the statistic balance, Biodex system (made in the USA) was applied. First the subject stood upright on the power surface of Biodex balance system. During this stage the volunteer is allowed to alter her foot place and choose the best place that she is able to do the aforesaid stages and has the most balance in the test condition. Thereafter, in all the test stages and also in the retest, the feet placed in the same recorded place. The tests included the stature stable test (ability to protect the pressure center in the middle of surface). Every test section was divided to three parts: warming up, measuring subjects’ foot size by caliper and sorting individuals in knee-valgus, genu-varus and normal knee groups and finally placing on Biodex system to assess the static and dynamic balance.

METHODS AND MATERIALS

After explaining the research to subjects, perfectly and justifying them about participation in this study, they have been asked to be present in the clinic of physical education institute. After receiving their testimonials, they started to warm up six minutes in the beginning of each section. The first three minutes spent to soft running and the second three minutes was related to tensional movements. The subjects were those who didn’t have any surgery record on their lower and upper limb. They also didn’t have any illness and sight, auricular, nerve and muscular disorder. After choosing the subjects, all the three groups have been tested. First the whole process was explained to them, then they’re been asked to do the test with the aim of familiarity. When they recognized their duty, they were requested to do their best in the test and do it accurately. To stimulate them to do the test effectively, the oral encouragements were used. The subject stood bare foot on the system and did the static balance test. If the subject’s heels were separated from the Biodex surface or the knees were bent, the test would be stopped and repeated. The amount of foot pressure center fluctuation is considerable as balance disorder lines in sending the data in mechanical strength and stability of every joint and the lower limb structure. This is probably observed in individuals having genu-varus.

The findings:

Totally the results showed that three groups in the static balance revealed a significant difference when they were assessed by the stable posture test. As you see in the following chart, both groups which have the lower limb abnormalities show weaker function in the static balance as compared with the control group, but the knee-valgus and genu-varus groups don’t show a significant difference[9].

Table 1: the descriptive statistics of posture stability index.

<table>
<thead>
<tr>
<th>Group</th>
<th>Healthy</th>
<th>Knee-valgus</th>
<th>Genu-varus</th>
<th>Score</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.16 ± 2.25</td>
<td>2.18 ± 1.25</td>
<td>2.046 ± 0.66</td>
<td>Total</td>
<td>Posture Stability</td>
<td></td>
</tr>
</tbody>
</table>

*Indicator of significant difference with the healthy group.

Table 2: the follow-up test results of one-way variance analysis to compare the posture stability index

<table>
<thead>
<tr>
<th>sig</th>
<th>F 2,42</th>
<th>Mean of error squares</th>
<th>Total of error squares</th>
<th>Square mean</th>
<th>Total group squares</th>
<th>index</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000</td>
<td>52/165</td>
<td>2/440</td>
<td>102/487</td>
<td>127/292</td>
<td>254/584</td>
<td>Posture stability</td>
</tr>
</tbody>
</table>

*Indicator of significant difference with the healthy group.

Graph 1. The follow-up test results of one way-variance analysis to compare the posture stability index.

Discussion:

As the results show both groups which have the lower limb disorder, indicate a weaker function in the static balance as compared with the control group, but the knee-valgus and genu-varus groups don’t have a significant difference. The researchers reported that in the lower limb abnormalities the myonicity could protect the gravity center in the learning surface disorderly and with delay.

This function disorder could cause the abnormal torques. This itself causes the gravity line keep aloof from learning surface which finally disorders the balance [15]. As we know the lower limb in most sport activities acts in a closed chain. This chain it’s suitable function depends on the interaction of pelvis, knee and ankle joint movements. The balance is disordered during disorder lines in sending the data in mechanical strength and stability of every joint and the lower limb structure. This is probably observed in individuals having genu-varus.

**Note:** The specific values and variables in the tables and figures are not directly transcribed due to the nature of the data and the context provided in the text.
abnormality [10]. Keep Raiv (1997) argued that the muscular group. This itself results in postural changes. In this case the research results done by karimi.et.al (2011) showed that geneva varum abnormalities cause several changes in kinematics and kinetics variables in sagittal, horizontal plate of knee joint. This sagittal plate abnormality caused a significant decrease of maximum of knee extension torque and maximum of knee extension range in the final stage of walking and eventually affects the balance. The lack of fitness could cause more fatigue, since the more the body looses it’s balance, the more it needs energy to stand straight. Because muscles relating to the posture have less mechanical score, to keep the balance and instead they ought to engage in activity which this itself leads to the fatigue[2]. Totally, inequality of the antagonist and agonist muscles strength in an organ and inadequacy of muscles flexibility are of the factors which have a negative effect on the body condition. Indeed a person can imaginably prevail his defect in motion range, using more motion range in other muscles to achieve a special target [9]. Moreover it has been shown that the subjects didn’t have a significant difference in the static balance. That was in contrast to cote’s view (2005), who in a study argued due to anatomic structure of foot and it’s location in the lowest part of motion chain in the lower limb, the smallest biomechanical changes in the learning surface affects the posture control. Cote believed the increasing pronated and supinated foot postures are of the changes which affect the circumferential input, by changing the joint mobility. The contact surface with the land or secondly by changing the muscular strategies to protect the stable leaning surface[7], the probable reasons of these heterogeneities in the present study and cote’s study could be different level of duty difficulty, different level of subjects’ mastery and applying various methods and means in assessing the balanced condition as compared with the present study. Ross (2003) believes that the ability of gaining fast stability is one of the main factors in injury prevention [14]. During the last decade inspite of increasing usage of balance tests to assess and regain posture control among individuals, little studies have been done to assess the prevalent disorders in the lower limb such as foot role and species in performing the posture control documentary test [10].

Conclusion:
The direction less in the lower limb leads to extra pressures on the muscles joints and bones which reveals more among athletes. Considering the research results it seems that the weakness in some parameters of static balance as one of the lower limb abnormality results could be concentrated[12]. So it is suggested in situations which the individuals have the structural and functional lower limb abnormalities use exercise to keep the balance, to decrease the injuries. Of course it should be mentioned that various factors such as body sensory, the sight, auricular and motion responses could affect the balance which influence the joint motion range.

REFERENCES


